

# SEQUENCE LISTING

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<120> MALATHION CARBOXYLESTERASE

<130> Attorney Docket No. 50179-051

<140> 09/068,960

<141> 1998-06-20

<150> PCT/AU96/00746

<151> 1996-11-22

<150> AU 6751

<151> 1995-11-23

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<170> PatentIn Ver. 2.0

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Ile	Asn	Ile	Gln	Tyr	Arg	Leu	Gly	Ala	Leu	Gly	Phe	Leu	Ser	Leu	Asn	
			165					170						175		
Ser	Glu	Asp	Leu	Asn	Val	Pro	Gly	Asn	Ala	Gly	Leu	Lys	Asp	Gln	Val	
		180						185					190			
Met	Ala	Leu	Arg	Trp	Ile	Lys	Asn	Asn	Cys	Ala	Asn	Phe	Gly	Gly	Asn	
	195					200						205				
Pro	Asp	Asn	Ile	Thr	Val	Phe	Gly	Glu	Ser	Ala	Gly	Ala	Ala	Ser	Thr	
	210					215					220					
His	Tyr	Met	Met	Leu	Thr	Glu	Gln	Thr	Arg	Gly	Leu	Phe	His	Arg	Gly	
	225				230					235					240	
Ile	Leu	Met	Ser	Gly	Asn	Ala	Ile	Cys	Pro	Trp	Ala	Asn	Thr	Gln	Cys	
			245					250						255		
Gln	His	Arg	Ala	Phe	Thr	Leu	Ala	Lys	Leu	Ala	Gly	Tyr	Lys	Gly	Glu	
		260						265					270			
Asp	Asn	Asp	Lys	Asp	Val	Leu	Glu	Phe	Leu	Met	Lys	Ala	Lys	Pro	Gln	
	275						280					285				
Asp	Leu	Ile	Lys	Leu	Glu	Glu	Lys	Val	Leu	Thr	Leu	Glu	Glu	Arg	Thr	
	290				295						300					
Asn	Lys	Val	Met	Phe	Pro	Phe	Gly	Pro	Thr	Val	Glu	Pro	Tyr	Gln	Thr	
	305				310					315					320	
Ala	Asp	Cys	Val	Leu	Pro	Lys	His	Pro	Arg	Glu	Met	Val	Lys	Thr	Ala	
			325						330					335		
Trp	Gly	Asn	Ser	Ile	Pro	Thr	Met	Met	Gly	Asn	Thr	Ser	Tyr	Glu	Gly	

	340		345		350
Leu Phe Phe Thr Ser Ile Leu Lys Gln Met Pro Met Leu Val Lys Glu					
	355		360		365
Leu Glu Thr Cys Val Asn Phe Val Pro Ser Glu Leu Ala Asp Ala Glu					
	370		375		380
Arg Thr Ala Pro Glu Thr Leu Glu Met Gly Ala Lys Ile Lys Lys Ala					
	385		390		395
His Val Thr Gly Glu Thr Pro Thr Ala Asp Asn Phe Met Asp Leu Cys					
		405		410	415
Ser His Ile Tyr Phe Trp Phe Pro Met His Arg Leu Leu Gln Leu Arg					
		420		425	430
Phe Asn His Thr Ser Gly Thr Pro Val Tyr Leu Tyr Arg Phe Asp Phe					
		435		440	445
Asp Ser Glu Asp Leu Ile Asn Pro Tyr Arg Ile Met Arg Ser Gly Arg					
		450		455	460
Gly Val Lys Gly Val Ser His Ala Asp Glu Leu Thr Tyr Phe Phe Trp					
		465		470	475
Asn Gln Leu Ala Lys Arg Met Pro Lys Glu Ser Arg Glu Tyr Lys Thr					
		485		490	495
Ile Glu Arg Met Thr Gly Ile Trp Ile Gln Phe Ala Thr Thr Gly Asn					
		500		505	510
Pro Tyr Ser Asn Glu Ile Glu Gly Met Glu Asn Val Ser Trp Asp Pro					
		515		520	525
Ile Lys Lys Ser Asp Glu Val Tyr Lys Cys Leu Asn Ile Ser Asp Glu					
		530		535	540
Leu Lys Met Ile Asp Val Pro Glu Met Asp Lys Ile Lys Gln Trp Glu					
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Ser Met Phe Glu Lys His Arg Asp Leu Phe					
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<210> 9

<211> 1713

<212> DNA

<213> Lucilia cuprina

<400> 9

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aaagtgaaag gcgttaaacg tttaactgtg tacgatgatt cctactacag ttttgagggt 180
ataccgtacg cccaaccgcc agtgggtgag ctgagattta aagcacccca gcgaccaaca 240
ccctgggatg gtgtgcggtga ttgttgcaat cataaagata agtcagtga agttgatttt 300
ataacgggca aagtgtgtgg ctacagaggat tgtctatacc taagtgtcta tacgaataat 360
ctaaatcccc aaactaaacg tcccgtttta gtatacatat atggtggtgg ttttattatc 420

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aatgtgcccg gtaatgccgg ccttaaagat caagtcattg ccttgcggtg gattaaaaat 600
aatgtgcgca actttgggtg caatcccgat aatattacag tctttgggtg aagtgccggg 660
gctgcctcta cccactacat gatgttaacc gaacaaactc gcggctcttt ccacgtggg 720
ataactaatg cgggtaatgc tatttgtcca ttggctaata cccaatgtca acatcggtgc 780
ttcaccttag ccaaattggc cggctataag ggtgaggata atgataagga tgttttggaa 840
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gaagagcgta caaataaggt catgtttcct tttgggtcca ctgttgagcc atatcagacc 960
gctgattgtg tcttaccctc acatcctcgg gaaatgggta aaactgcttg gggtaattcg 1020
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atggaaaatg tttcctggga tccaattaag aaatccgatg aagtatacaa gtgtttgaat 1620
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<210> 10

<211> 570

<212> PRT

<213> *Lucilia cuprina*

<400> 10

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Cys Ile Glu Asn Lys Phe Leu Asn Tyr Arg Leu Thr Thr Asn Glu Thr
          20                      25                      30

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Val Val Ala Glu Thr Glu Tyr Gly Lys Val Lys Gly Val Lys Arg Leu
          35                      40                      45

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Thr Val Tyr Asp Asp Ser Tyr Tyr Ser Phe Glu Gly Ile Pro Tyr Ala
          50                      55                      60

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Gln Pro Pro Val Gly Glu Leu Arg Phe Lys Ala Pro Gln Arg Pro Thr
          65                      70                      75                      80

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Pro Trp Asp Gly Val Arg Asp Cys Cys Asn His Lys Asp Lys Ser Val
          85                      90                      95

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Gln Val Asp Phe Ile Thr Gly Lys Val Cys Gly Ser Glu Asp Cys Leu
          100                     105                     110

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Tyr Leu Ser Val Tyr Thr Asn Asn Leu Asn Pro Glu Thr Lys Arg Pro
          115                     120                     125

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Val Leu Val Tyr Ile His Gly Gly Gly Phe Ile Ile Gly Glu Asn His
          130                     135                     140

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Arg Asp Met Tyr Gly Pro Asp Tyr Phe Ile Lys Lys Asp Val Val Leu
          145                     150                     155                     160

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Ile Asn Ile Gln Tyr Arg Leu Gly Ala Leu Gly Phe Leu Ser Leu Asn  
165 170 175

Ser Glu Asp Leu Asn Val Pro Gly Asn Ala Gly Leu Lys Asp Gln Val  
180 185 190

Met Ala Leu Arg Trp Ile Lys Asn Asn Cys Ala Asn Phe Gly Gly Asn  
195 200 205

Pro Asp Asn Ile Thr Val Phe Gly Glu Ser Ala Gly Ala Ala Ser Thr  
210 215 220

His Tyr Met Met Leu Thr Glu Gln Thr Arg Gly Leu Phe His Arg Gly  
225 230 235 240

Ile Leu Met Ser Gly Asn Ala Ile Cys Pro Leu Ala Asn Thr Gln Cys  
245 250 255

Gln His Arg Ala Phe Thr Leu Ala Lys Leu Ala Gly Tyr Lys Gly Glu  
260 265 270

Asp Asn Asp Lys Asp Val Leu Glu Phe Leu Met Lys Ala Lys Pro Gln  
275 280 285

Asp Leu Ile Lys Leu Glu Glu Lys Val Leu Thr Leu Glu Glu Arg Thr  
290 295 300

Asn Lys Val Met Phe Pro Phe Gly Pro Thr Val Glu Pro Tyr Gln Thr  
305 310 315 320

Ala Asp Cys Val Leu Pro Lys His Pro Arg Glu Met Val Lys Thr Ala  
325 330 335

Trp Gly Asn Ser Ile Pro Thr Met Met Gly Asn Thr Ser Tyr Glu Gly  
340 345 350

Leu Phe Phe Thr Ser Ile Leu Lys Gln Met Pro Met Leu Val Lys Glu  
355 360 365

Leu Glu Thr Cys Val Asn Phe Val Pro Ser Glu Leu Ala Asp Ala Glu  
370 375 380

Arg Thr Ala Pro Glu Thr Leu Glu Met Gly Ala Lys Ile Lys Lys Ala  
385 390 395 400

His Val Thr Gly Glu Thr Pro Thr Ala Asp Asn Phe Met Asp Leu Cys  
405 410 415

Ser His Ile Tyr Phe Trp Phe Pro Met His Arg Leu Leu Gln Leu Arg  
420 425 430

Phe Asn His Thr Ser Gly Thr Pro Val Tyr Leu Tyr Arg Phe Asp Phe  
435 440 445

Asp Ser Glu Asp Leu Ile Asn Pro Tyr Arg Ile Met Arg Ser Gly Arg  
450 455 460

Gly Val Lys Gly Val Ser His Ala Asp Glu Leu Thr Tyr Phe Phe Trp  
 465 470 475 480  
 Asn Gln Leu Ala Lys Arg Met Pro Lys Glu Ser Arg Glu Tyr Lys Thr  
 485 490 495  
 Ile Glu Arg Met Thr Gly Ile Trp Ile Gln Phe Ala Thr Thr Gly Asn  
 500 505 510  
 Pro Tyr Ser Asn Glu Ile Glu Gly Met Glu Asn Val Ser Trp Asp Pro  
 515 520 525  
 Ile Lys Lys Ser Asp Glu Val Tyr Lys Cys Leu Asn Ile Ser Asp Glu  
 530 535 540  
 Leu Lys Met Ile Asp Val Pro Glu Met Asp Lys Ile Lys Gln Trp Glu  
 545 550 555 560  
 Ser Met Phe Glu Lys His Arg Asp Leu Phe  
 565 570

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 <211> 26  
 <212> DNA  
 <213> *Lucilia cuprina*

<400> 11  
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<210> 12  
 <211> 28  
 <212> DNA  
 <213> *Lucilia cuprina*

<400> 12  
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<210> 13  
 <211> 570  
 <212> PRT  
 <213> *Musca domestica*

<400> 13  
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 Cys Met Val Asn Lys Tyr Thr Asn Tyr Arg Leu Ser Thr Asn Glu Thr  
 20 25 30  
 Gln Ile Ile Asp Thr Glu Tyr Gly Gln Ile Lys Gly Val Lys Arg Met  
 35 40 45  
 Thr Val Tyr Asp Asp Ser Tyr Tyr Ser Phe Glu Ser Ile Pro Tyr Ala  
 50 55 60  
 Lys Pro Pro Val Gly Glu Leu Arg Phe Lys Ala Pro Gln Arg Pro Val  
 65 70 75 80

Pro Trp Glu Gly Val Arg Asp Cys Cys Gly Pro Ala Asn Arg Ser Val  
 85 90 95  
 Gln Thr Asp Phe Ile Ser Gly Lys Pro Thr Gly Ser Glu Asp Cys Leu  
 100 105 110  
 Tyr Leu Asn Val Tyr Thr Asn Asp Leu Asn Pro Asp Lys Arg Arg Pro  
 115 120 125  
 Val Met Val Phe Ile His Gly Gly Asp Phe Ile Phe Gly Glu Ala Asn  
 130 135 140  
 Arg Asn Trp Phe Gly Pro Asp Tyr Phe Met Lys Lys Pro Val Val Leu  
 145 150 155 160  
 Val Thr Val Gln Tyr Arg Leu Gly Val Leu Gly Phe Leu Ser Leu Lys  
 165 170 175  
 Ser Glu Asn Leu Asn Val Pro Gly Asn Ala Gly Leu Lys Asp Gln Val  
 180 185 190  
 Met Ala Leu Arg Trp Val Lys Ser Asn Ile Ala Ile Phe Gly Gly Asp  
 195 200 205  
 Val Asp Asn Ile Thr Val Phe Gly Glu Ser Ala Gly Gly Ala Ser Thr  
 210 215 220  
 His Tyr Met Met Ile Thr Glu Gln Thr Arg Gly Leu Phe His Arg Gly  
 225 230 235 240  
 Ile Met Met Ser Gly Asn Ser Met Cys Ser Trp Ala Ser Thr Glu Cys  
 245 250 255  
 Gln Ser Arg Ala Leu Thr Met Ala Lys Arg Val Gly Tyr Lys Gly Glu  
 260 265 270  
 Asp Asn Glu Lys Asp Ile Leu Glu Phe Leu Met Lys Ala Asn Pro Tyr  
 275 280 285  
 Asp Leu Ile Lys Glu Glu Pro Gln Val Leu Thr Pro Glu Arg Met Gln  
 290 295 300  
 Asn Lys Val Met Phe Pro Phe Gly Pro Thr Val Glu Pro Tyr Gln Thr  
 305 310 315 320  
 Ala Asp Cys Val Val Pro Lys Pro Ile Arg Glu Met Val Lys Ser Ala  
 325 330 335  
 Trp Gly Asn Ser Ile Pro Thr Leu Ile Gly Asn Thr Ser Tyr Glu Gly  
 340 345 350  
 Leu Leu Ser Lys Ser Val Ala Lys Gln Tyr Pro Glu Val Val Lys Glu  
 355 360 365  
 Leu Glu Ser Cys Val Asn Tyr Val Pro Trp Glu Leu Ala Asp Ser Glu  
 370 375 380

Arg Ser Ala Pro Glu Thr Leu Glu Arg Ala Ala Ile Val Lys Lys Ala  
385 390 395 400

His Val Asp Gly Glu Thr Pro Thr Leu Asp Asn Phe Met Glu Leu Cys  
405 410 415

Ser Tyr Phe Tyr Phe Leu Phe Pro Met His Arg Phe Leu Gln Leu Arg  
420 425 430

Phe Asn His Thr Ala Gly Thr Pro Ile Tyr Leu Tyr Arg Phe Asp Phe  
435 440 445

Asp Ser Glu Glu Ile Ile Asn Pro Tyr Arg Ile Met Arg Phe Gly Arg  
450 455 460

Gly Val Lys Gly Val Ser His Ala Asp Glu Leu Thr Tyr Leu Phe Trp  
465 470 475 480

Asn Ile Leu Ser Lys Arg Leu Pro Lys Glu Ser Arg Glu Tyr Lys Thr  
485 490 495

Ile Glu Arg Met Val Gly Ile Trp Thr Glu Phe Ala Thr Thr Gly Lys  
500 505 510

Pro Tyr Ser Asn Asp Ile Ala Gly Met Glu Asn Leu Thr Trp Asp Pro  
515 520 525

Ile Lys Lys Ser Asp Asp Val Tyr Lys Cys Leu Asn Ile Gly Asp Glu  
530 535 540

Leu Lys Val Met Asp Leu Pro Glu Met Asp Lys Ile Lys Gln Gly Ala  
545 550 555 560

Ser Ile Phe Asp Lys Lys Lys Glu Leu Phe  
565 570

<210> 14

<211> 1710

<212> DNA

<213> Musca domestica

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caaattaagg gtgttaagcg aatgaccgtc tacgatgatt cttactacag tttcgagagt 180  
ataccctatg ctaagcctcc agtgggtgag ttgagattca aggcacccca gcggcctgta 240  
ccatgggagg gtgtacgtga ttgctgtggg ccagccaaca gatcgggtaca gacagatttc 300  
ataagtggca aacccacagg ttcgaggat tgtctatacc tgaatgtgta taccaatgac 360  
ttgaaccag acaaaaggcg tctgttatg gttttcatcc atggcggaga ttttattttc 420  
ggcgaagcaa atcgtaactg gtttggtccc gactacttta tgaagaaacc cgtggtcttg 480  
gtaaccgtgc aatatcgttt ggggtgtgtt ggtttcctta gcctgaaatc ggaaaatctc 540  
aatgtccccg gcaacgctgg cctcaaggat caagtaatgg ccttgagatg ggtcaagagt 600  
aatattgcc aatttcggtg cgatgtagac aatattaccg tcttcggcga aagtgtgtgt 660  
ggggcctcaa cccattacat gatgataacc gaacagaccc gtggtttatt ccatcgtggt 720  
atcatgatgt ccggtaatc catgtgctca tgggcctcta cagaatgcc aagtcgtgctg 780  
ctcaccatgg ccaaacgtgt tggctataag ggagaggaca atgaaaaaga tatcctggaa 840  
ttcctaataa aagccaatcc ctatgatttg atcaaagagg agccacaagt tttgacaccc 900



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gccgactgtg tggtagccaa accaatcaga gaaatggtga agagcgctg gggaaattcg 1020
ataccacat tgataggcaa tacctoctac gaaggtttgc tttccaaatc aattgccaaa 1080
caatatccgg aggttgtaaa agagttggaa tcctgtgtga attatgtgcc ttgggagttg 1140
gctgacagtg aacgcagtgc cccggaaacc ctggagaggg ctgccattgt gaaaaaggcc 1200
catgtggatg gggaaacacc tactctggat aattttatgg agctttgctc ctatttctat 1260
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atggaaaacc tcacctggga tcccataaaa aaatccgatg atgtctataa atgtttaaat 1620
atcggcgatg aattgaaagt tatggatttg ccagaaatgg ataaaattaa acaatgggca 1680
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<210> 15

<211> 207

<212> PRT

<213> Musca domestica

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20 25 30

Val Met Val Phe Ile His Gly Gly Gly Phe Ile Phe Gly Glu Ala Asn  
35 40 45

Arg Asn Trp Tyr Gly Pro Asp Tyr Phe Met Lys Lys Pro Val Val Leu  
50 55 60

Val Thr Val Gln Tyr Arg Leu Gly Val Leu Gly Phe Leu Ser Leu Lys  
65 70 75 80

Ser Glu Asn Leu Asn Val Pro Gly Asn Ala Gly Leu Lys Asp Gln Val  
85 90 95

Met Ala Leu Arg Trp Phe Lys Ser Asn Ile Ala Ile Phe Gly Gly Asp  
100 105 110

Val Asp Asn Ile Thr Val Phe Gly Glu Ser Ala Gly Gly Ala Ser Thr  
115 120 125

His Tyr Met Met Ile Thr Glu Gln Thr Arg Gly Leu Phe His Arg Gly  
130 135 140

Ile Met Met Ser Gly Asn Ser Met Cys Ser Ser Ala Ser Thr Glu Cys  
145 150 155 160

Gln Ser Arg Ala Leu Thr Met Ala Lys Arg Val Gly Tyr Lys Gly Glu  
165 170 175

Glu Asn Glu Lys Asp Ile Leu Glu Phe Leu Met Lys Ala Asn Pro Tyr  
180 185 190

Asp Leu Ile Lys Glu Glu Pro Gln Val Leu Thr Pro Glu Arg Met

<210> 16  
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<210> 17  
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<400> 17  
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<210> 18  
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<400> 18  
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<210> 19  
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<210> 21  
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<400> 21  
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<210> 22  
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<400> 23  
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<210> 25  
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<400> 25  
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<210> 26  
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<400> 26  
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<210> 27  
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<400> 27  
acgcgattct ttaggcatac g 21

<210> 28  
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<400> 28  
tgctgcctct acccactaca t 21

<210> 29  
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<212> DNA  
<213> Lucilia cuprina

<400> 29  
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<210> 30

<211> 35  
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Primer

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<220>  
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<223> i

<220>  
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<223> i

<220>  
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<223> i

<220>  
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<223> i

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35

<210> 31  
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Primer

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32

<210> 32

<211> 22

<212> DNA

<213> Musca domestica

<400> 32

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22

<210> 33

<211> 24

<212> DNA

<213> Musca domestica

<400> 33

tgccacttat gaaatctgtc tgta

24

<210> 34

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<212> DNA

<213> Musca domestica

<400> 34

tacatgatga taaccgaaca gacc

24

<210> 35

<211> 23

<212> DNA

<213> Musca domestica

<400> 35

tcgattatatt gggtttcatt tgt

23

<210> 36

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<212> DNA

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<210> 38  
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<400> 38  
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<210> 40  
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<400> 40  
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<400> 41  
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<400> 42  
ggcatggaaa acctcacctg g 21

<210> 43  
<211> 207  
<212> PRT  
<213> Lucilia cuprina

<400> 43  
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			20				25			30					
Val	Leu	Val	Tyr	Ile	His	Gly	Gly	Gly	Phe	Ile	Ile	Gly	Glu	Asn	His
			35				40			45					
Arg	Asp	Met	Tyr	Gly	Pro	Asp	Tyr	Phe	Ile	Lys	Lys	Asp	Val	Val	Leu
			50				55				60				
Ile	Asn	Ile	Gln	Tyr	Arg	Leu	Gly	Ala	Leu	Gly	Phe	Leu	Ser	Leu	Asn
65			70			75			80						
Ser	Glu	Asp	Leu	Asn	Val	Pro	Gly	Asn	Ala	Gly	Leu	Lys	Asp	Gln	Val
			85			90			95						
Met	Ala	Leu	Arg	Trp	Ile	Lys	Asn	Asn	Cys	Ala	Asn	Phe	Gly	Gly	Asn
			100				105			110					
Pro	Asp	Asn	Ile	Thr	Val	Phe	Gly	Glu	Ser	Ala	Gly	Ala	Ala	Ser	Thr
			115				120				125				
His	Tyr	Met	Met	Leu	Thr	Glu	Gln	Thr	Arg	Gly	Leu	Phe	His	Arg	Gly
130						135				140					
Ile	Leu	Met	Ser	Gly	Asn	Ala	Ile	Cys	Pro	Leu	Ala	Asn	Thr	Gln	Cys
145			150			155			160						
Gln	His	Arg	Ala	Phe	Thr	Leu	Ala	Lys	Leu	Ala	Gly	Tyr	Lys	Gly	Glu
			165			170			175						
Asp	Asn	Asp	Lys	Asp	Val	Leu	Glu	Phe	Leu	Met	Lys	Ala	Lys	Pro	Gln
			180				185			190					
Asp	Leu	Ile	Lys	Leu	Glu	Glu	Lys	Val	Leu	Thr	Leu	Glu	Glu	Arg	
			195				200			205					